

A description of the primary habitat of the Purple-crowned Fairy-wren *Malurus coronatus coronatus* in the Victoria River District, N.T.

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Abstract

The habitat of the Purple-crowned Fairy-wren in the Victoria River District is described, with particular reference to the density of the riparian grass *Chionachne gyathopoda*, based on 75 vegetation transects sampled in 39 fairy-wren territories. This paper also clarifies confusion about the primary habitat of the fairy-wren with respect to another riparian grass, *Mnesithea rottboellioides*, which shares with *C. gyathopoda* the common name Canegrass. To assist successful management and conservation we provide a guide to correctly distinguish these two grasses and recommend the use of the common name Rivergrass for *C. gyathopoda* and Northern Canegrass for *M. rottboellioides*.

Introduction

The Purple-crowned Fairy-wren *Malurus coronatus* is a small insectivorous passerine restricted to riverside vegetation in northern Australia. The western subspecies, *M. c. coronatus*, occurs from the Kimberley in Western Australia east to the Victoria River District (VRD) in the Northern Territory, and is currently listed as vulnerable both nationally by the Australian Government (Environment Protection and Biodiversity Conservation Act 1999) and in the Northern Territory (Territory Parks and Wildlife Conservation Act 2000).

The habitat relationships of the Purple-crowned Fairy-wren were studied in the Victoria River area, from 2001 to 2004 (van Doorn 2007b). Throughout the course of this study and subsequent correspondence with stakeholders, it was evident that confusion exists about the grass species constituting its preferred habitat in this area. This confusion has arisen as a result of the misapplication of scientific names based on common names and has been compounded by the fact that the Purple-crowned Fairy-wren utilises a number of grass species. Two species in particular are commonly

cited as the preferred habitat of the Purple-crowned Fairy-wren: *Chionachne cyathopoda* (F.Muell.) F.Muell. ex Benth. (Rowley & Russell 1997; Lewis 2002; van Doorn 2007a,b) and *Mnesithea rotthoellioides* (R.Br.) de Koning & Sosef (Rowley 1993; Rowley & Russell 1997; Horner & Trembath 2006).

The common name Canegrass has been widely used to describe a range of riparian grass species considered to provide habitat for Purple-crowned Fairy-wren (McGill 1970; Boekel 1979; Buckley 1986; Rowley 1988; Rowley 1993; Goodfellow & Stott 2001; Higgins *et al.* 2001; Flegg 2002; Pizzey & Knight 2003). As is often the case with common names, this represents a large number of species, many of which vary greatly in structure, ecology and distribution. In addition to *M. rotthoellioides* and *C. cyathopoda*, several other species have been referred to as Canegrass in association with the Purple-crowned Fairy-wren: *Ophiuros exaltatus* (Goodfellow and Stott 2001; Higgins *et al.* 2001), exotic Bamboo *Bambusa* sp. (Rowley 1993) and various *Sarga* (previously *Sorghum*) species (Goodfellow & Stott 2001).

The two riparian grasses, *C. cyathopoda* and *M. rotthoellioides*, are both widely distributed throughout tropical Asia and Australasia. In Australia, both species occur in northern Western Australia, Northern Territory and Queensland (Sharp & Simon 2002). Although widespread in geographic distribution, *C. cyathopoda* is typically narrowly restricted to alluvial banks of riversides (Petheram & Kok 2003). In contrast, *M. rotthoellioides* can be found in a wide variety of habitats associated with seasonal water. *C. cyathopoda* is a rhizomatous perennial grass, often forming dense entangled thickets along riparian corridors with average height of 2.7 m, although it can reach a height of up to 5 m (Table 1, Figure 1A) (Cowie *et al.* 2000). By comparison, *M. rotthoellioides* is a tussock perennial grass with foliage to 1.2 m that normally grows on upper banks with distinct gaps between plant bases (Figure 1B).

Here, we provide a description of the primary habitat of the western subspecies of the Purple-crowned Fairy-wren *M. c. coronatus* in the VRD with the particular aim of clarifying which riparian grass species provides its preferred habitat.

Methods

Extensive areas of the Victoria River and its tributaries were surveyed to determine presence or absence of the Purple-crowned Fairy-wren from April 2001 through October 2003 (van Doorn 2007b). The broad habitat structure defined by Rowley (1993) was used in conjunction with stakeholder consultation to identify areas for survey. Survey sites were often determined by accessibility whilst encompassing a large extent of more than 170 km of river frontage. The presence of Purple-crowned Fairy-wrens was established using "play-back", a technique used to accurately survey territorial fairy-wren species. During the survey, we found the Purple-crowned Fairy-wren only along the Victoria River. Subsequently, five field sites were established along the Victoria River for intensive study (Figure 2). At each study site in addition

to mist-netting birds, one of the primary techniques for determining territory boundaries was by recording any territorial singing, either individually or as a duet. Additionally, birds were followed regularly to monitor breeding and record foraging observations, enabling us to determine territory boundaries of groups (van Doorn 2007b). During the 2002 season, family groups were followed extensively and any territorial behaviour recorded and marked using a GPS (Garmin GPS II Plus <15m).

Table 1. Characteristics and recommended common names of *Chionachne cyathopoda* and *Mnesithea rottboellioides*, adapted from Sharp and Simon (2002) using data held by NRETAS (JLC). Note that both these genera contain two species in the NT with the other species of both genera (*Chionachne hubbardiana* and *Mnesithea formosa*) being small annual plants compared to their robust perennial counterparts.

	Species	
	<i>Chionachne cyathopoda</i> Rivergrass	<i>Mnesithea rottboellioides</i> Northern Canegrass
Habitat	Banks and tributaries of large rivers	Grassland / woodland associated with seasonal water including creeks / wetlands perched on sandstone plateaus
Soils	Various, from sand to loam to clay	Generally sandy loam
Gross plant morphology	Rhizomatous perennial with stems branching and intertwining to 4 m high	Tussock perennial with leaves arising from base to 1 m high
Leaf	Relatively small	Large, forming bulk of plant
Leaf attachment	Throughout length of stem	From base of plant
Reproductive (inflorescence) morphology	Robust, enclosed by a prominent sheath; lower half of functionally female flowers, upper half of functionally male flowers	Fine, in groups near the end of a long stem; sheath subtending flower groups not prominent
Reproductive (inflorescence) location	Terminal or in leaf axils	Stem exerted from the plant base commonly to 2 m

At each of the five fixed study sites, we mapped vegetation using a point intercept method along 50 metre transects. Transects (where possible two in each fairy-wren territory) were set up diagonal to the bank, parallel to each other and at least 20m apart to ensure the maximum coverage of the habitat. At each metre intercept we recorded substrate as either plant species, bareground or debris (primarily leaves and dried *C. cyathopoda* blades, or dead trunk/branch), and also substrate height, canopy cover (species) and canopy height. All data were collected during the 2002 dry season (June-September) after fairy-wren territories had been identified. All sites had a similar

fire history (i.e. no fire for at least 2 years), although they did have varying grazing pressures. This time of year was chosen for logistical reasons as three of the sites were not accessible during the wet season. Further, this period coincided with the breeding season, when vegetation cover and structure might be particularly important for nesting and foraging.

Seventy five vegetation transects were sampled in 2002 in 39 fairy-wren territories at the five field sites. Twenty two transects (in 14 territories) were conducted at Coolibah, five (in three territories) at Dashwood, 14 (in seven territories) at Fitzroy, and 17 (in nine territories) at two sites in Gregory National Park. There were only a few territories at the Dashwood Crossing site accounting for the low number of transects at that site.

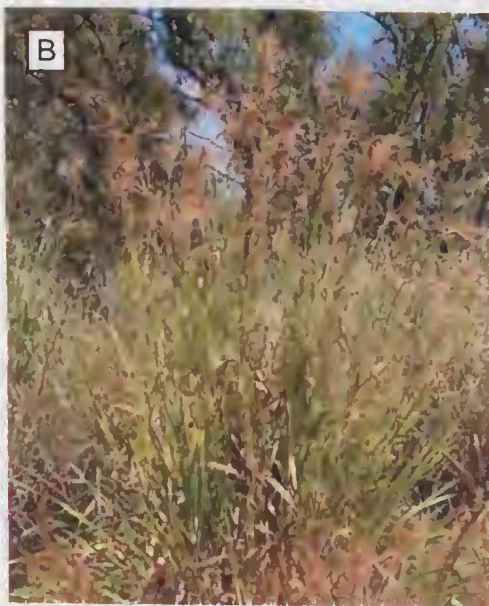


Figure 1. Comparative photographs taken along the Victoria River: A. Dense stand of Rivergrass *Chionachne cyathopoda* and B. Tussock of Northern Canegrass *Mnesithea rottboellioides*. (A. van Doorn)

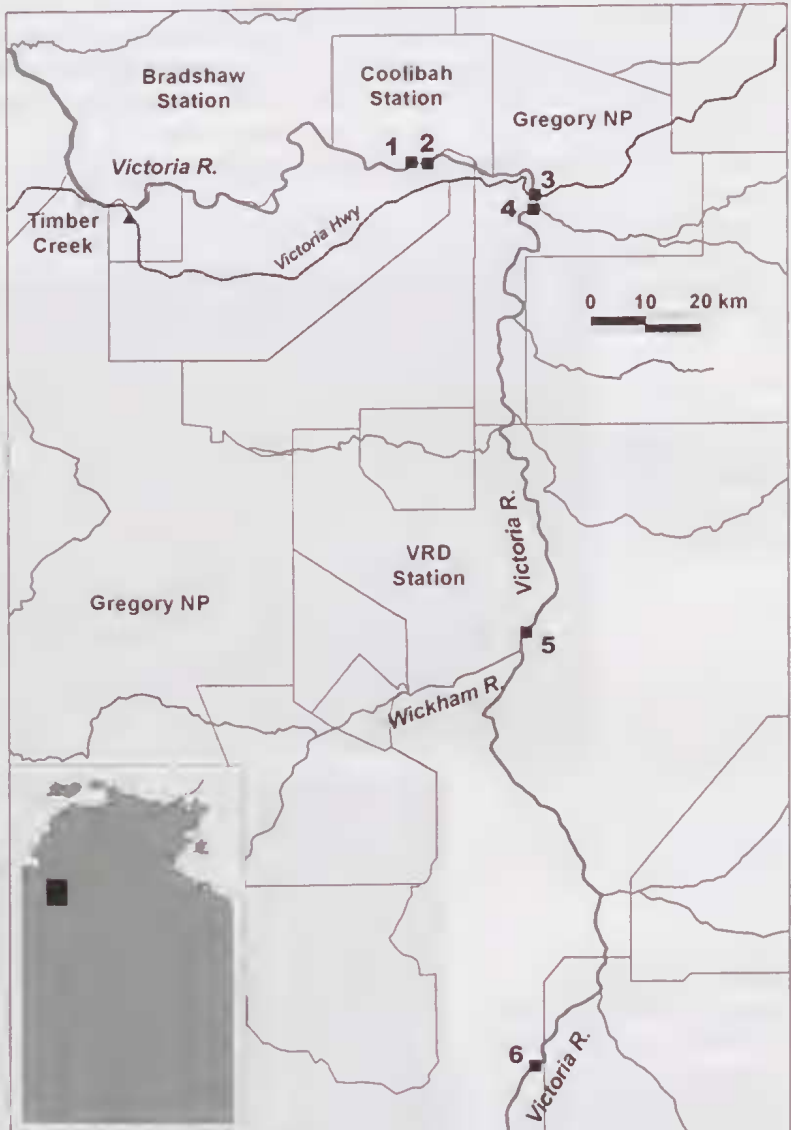


Figure 2. Location of study sites (1–5) (van Doorn 2007b) and additional site (no. 6) visited in 2008. 1. Fitzroy Station, 2. Coolibah Crocodile Farm, 3. Gregory National Park site 1, 4. Gregory National Park site 2, 5. Dashwood Crossing, Victoria River Downs Station, 6. Upper reaches of Victoria River. Indicated boundaries represent land tenure.

Results

Along the banks of the Victoria River the primary habitat of the Purple-crowned Fairy-wren is grasslands and/or woodlands with dense grass understorey dominated by *C. gyathopoda*. The dense stands formed by *C. gyathopoda* preclude most other vegetation and as such the habitat comprises largely of *C. gyathopoda*, debris and bare ground (Figure 3). *Chionachne gyathopoda* was present at all 75 transects and accounted for 19% of the understorey. Debris was the dominant non-vegetative cover and accounted for 53% of intersects (Figure 3). Debris was often very thick, especially at sites where *C. gyathopoda* was very dense. The average height of *C. gyathopoda* over all five sites was 2.5 metres. *Mnesithea rottboellioides* was recorded at nine transects and accounted for only 0.7% of the understorey. Weeds were common in the understorey and included Noogoora Burr (*Xanthium strumarium*), Castor Oil (*Ricinus communis*), and Wild Passionfruit (*Passiflora foetida*). At the study sites, Noogoora Burr was the most prevalent weed with an overall frequency of 2% (Figure 3). The low frequency and distribution of *M. rottboellioides* across transects, compared to *C. gyathopoda* supports the latter species being the preferred habitat of the Purple-crowned Fairy-wren.

The canopy layer comprised four tree species: *Eucalyptus microtheca* (Coolibah or Flooded Box), *E. camaldulensis* (River Red Gum), *Barringtonia acutangula* (Freshwater Mangrove) and *Ficus coronulata* (River Fig). The most common canopy species based on canopy cover were *E. microtheca* (58%), *E. camaldulensis* (27%), *Barringtonia* (6%) and *Ficus* (4%).

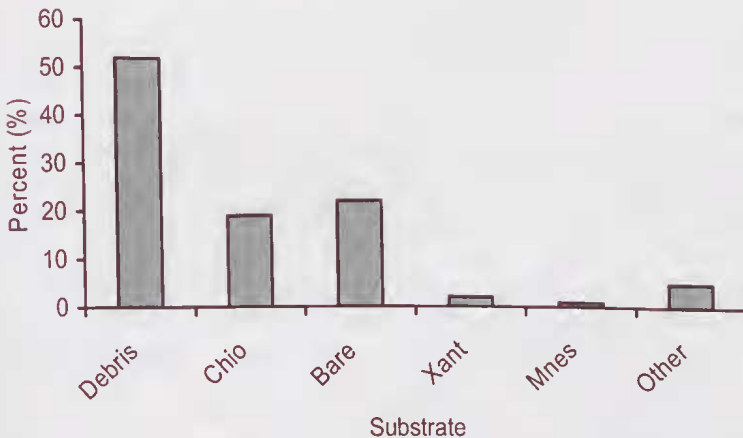


Figure 3. Groundcover frequencies (%) at study sites (n = 75). Debris = bare ground with debris, Chio = *Chionachne gyathopoda*, Bare = bare ground, Xant = *Xanthium strumarium*, Mnes = *Mnesithea roetbellioides*.

Discussion

There exists considerable disagreement in the literature about which grass species is the primary habitat of the Purple-crowned Fairy-wren along the Victoria River. Some authors have stated that *M. rotboellioides* is the primary habitat (Rowley 1993; Horner & Trembath 2006), while other authors have identified *C. gyathopoda* as the primary habitat (Rowley 1997; Lewis 2002). We suspect this discrepancy is a result of misidentification, confounded by these species sharing a common name. We resampled the sites visited by Horner & Trembath (2006) and Rowley (1993) and found the habitat to consist predominantly of *C. gyathopoda* and not *M. rotboellioides* as stated in these papers. The possibility of a change in floristics during the intervening period is not likely given the ecology of both species, in particular the long establishment period required to form any significant stands of *C. gyathopoda*.

Although *M. rotboellioides* did occur within some fairy-wren territories it was present in much lower densities than *C. gyathopoda*. Van Doorn (2007b) showed that although *M. rotboellioides* is sometimes used as a nesting substrate, Purple-crowned Fairy-wrens showed a strong preference for *C. gyathopoda* for nesting; 85% (55) of nests were located in *C. gyathopoda*. The remaining nests were placed in *M. rotboellioides* 14% (9), and one single nest (1%) was found in a *Barringtonia* sapling. During this same study, *C. gyathopoda* was also found to be a preferred foraging substrate (60% of observations) suggesting that in the VRD this grass species is critical in the conservation and management of the Purple-crowned Fairy-wren.

In the Kimberley (WA), Purple-crowned Fairy-wrens were found predominantly in *Pandanus aquaticus* habitat (Rowley 1993). Our surveys in 2001 through 2003 failed to locate fairy-wrens in *P. aquaticus* habitat in the lower reaches of the Victoria River (Bradshaw and Timber Creek upstream to the Victoria River Access in Gregory National Park, Figure 2). Thirty years ago, the Purple-crowned Fairy-wren was found in riparian areas dominated by *P. aquaticus* rather than dense grasses (Boeckel 1979) at some sites in the Victoria River system, notably the Wickham River near the Victoria River junction (Figure 2). Boeckel (1979) described the low density and patchy distribution of birds and expressed concern for the future survival of that population. A 2008 survey of this same area and the upper reaches of the Victoria River located Purple-crowned Fairy-wrens in *P. aquaticus* habitat. The distribution of both populations was fragmented and patchy (A. van Doorn, M. Damian & A. Northey unpubl.). During the 2008 survey, fairy-wrens at Dashwood Crossing which were previously located in *C. gyathopoda* were found using *P. aquaticus* habitat. At this location, *C. gyathopoda* had been almost completely destroyed by intense grazing with only very small clumps or individual plants left. It is possible that *P. aquaticus* is an important habitat component where *C. gyathopoda* habitat has been lost or degraded.

In the VRD, dense tall riverside stands of *C. gyathopoda* not only form the primary habitat for Purple-crowned Fairy-wren, but may also provide an important source of food for many other bird species. Large flocks of finches (e.g. Star Finch *Neocbmia*

ruficauda, Crimson Finch *N. phaeton*, Yellow-rumped Mannikin *Lonchura flaviprymna* and Chestnut-breasted Mannikin *L. castaneothorax*) congregate in the grass when it is seeding (van Doorn 2007b).

Unfortunately, *C. gyathopoda* is heavily impacted by grazing and trampling in unfenced areas during the extended dry season when cattle congregate along the riparian corridor. This results in significantly reduced densities of Purple-crowned Fairy-wren at heavily grazed sites. Van Doorn (2007b) found that intensely grazed sites had an average *C. gyathopoda* height of 2.2 m compared to an average height of 2.7 m at ungrazed sites. In addition, grazed sites had higher frequencies of bare ground (20-42%) in comparison to ungrazed sites (8-12%). Moreover, monitoring of marked birds over two years demonstrated a decline in the annual survival rate of adult fairy-wrens from 90% to 26% following the introduction of grazing but no significant decline at a site that remained ungrazed throughout (van Doorn 2007b).

Hot fires (i.e. during the late dry season) also pose a threat to the Purple-crowned Fairy-wren especially where *C. gyathopoda* occurs in long continuous stretches along the river. Although *C. gyathopoda* regenerates quickly, a reduction of Purple-crowned Fairy-wren density is evident, most likely as a result of direct mortality and increased predation due to lack of suitable cover after such an event (van Doorn 2007b, A. van Doorn unpubl. data). Preliminary data also suggest that breeding may be affected for up to two seasons after a hot fire (A. van Doorn, unpubl. data).

Currently, the riparian zone along the Victoria River is under multiple tenures and land uses; these include areas devoted to conservation (Gregory National Park), defence (Bradshaw Field Training Area), pastoralism and Aboriginal land uses. There has recently been an increase in the conservation initiatives for the Purple-crowned Fairy-wren among all these tenures and an understanding of the primary habitat of this species is essential for any management strategies (e.g. van Doorn 2007a, 2008).

Major road works affecting fairy-wren habitat along the Victoria River have recently commenced, necessitating removal of approximately one hectare of Purple-crowned Fairy-wren habitat. Actions to mitigate the impacts of this disturbance include monitoring Purple-crowned Fairy-wren habitat and implementing management strategies to improve habitat along the Victoria River.

In order to establish successful management and conservation plans for the Purple-crowned Fairy-wren in the VRD, it is essential that the primary habitat is accurately identified. Confusion that has arisen in regard to the common name Canegrass as it applies to the Purple-crowned Fairy-wren habitat illustrates the importance of species identification and the use of scientific names. Although use of the common name Canegrass is valuable during communications with local stakeholders, it is extremely important to identify the correct species to avoid confusion that may hinder conservation or management strategies.

Whilst acknowledging that the name Canegrass is well entrenched with respect to *C. gyathopoda* we reinforce the following preferred common names and recommend that these names are consistently applied and always accompanied by their correct scientific name; Rivergrass for *Chionachne gyathopoda* and Northern Canegrass for *Mnesithea rottboellioides* (Sharp & Simon 2002). To ensure these two grass species are correctly identified we provide the means to distinguish the two grasses through the summary of morphological and ecological characteristics in Table 1 and photographs of each species in Figure 1.

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References

- Boekel C. (1979) Notes on the status and behaviour of the Purple-crowned Fairy-wren *Malurus coronatus* in the Victoria River Downs area, Northern Territory. *Australian Bird Watcher* 8, 91-97.
- Buckley R. (1986) *Distribution of the Purple Crowned Wren, Malurus coronatus, along the Drysdale River, East Kimberley, Western Australia*. Report for World Wildlife Fund Project 47.
- Cowie I.D., Short P.S. and Osterkamp Madsen M. (2000) *Floodplain flora: a flora of the coastal floodplains of the Northern Territory, Australia*. Australian Biological Resources Study, Canberra/PWCNT, Darwin.
- Flegg J. (2002) *Photographic Field Guide: Birds of Australia*. New Holland, Frenchs Forest, N.S.W.
- Goodfellow D.L. and Stott M. (2001) *Birds of Australia's Top End*. Scrubfowl Press, Parap.
- Higgins P.J., Peter J.M. and Storrs G.M. (eds). (2001) *Handbook of Australian, New Zealand and Antarctic Birds. Vol. 5: Tyrant-flycatchers to chats*. Oxford University Press, Melbourne.
- Horner P. and Trembath D. (2006) *A Survey for Purple-Crowned Fairy Wrens (Malurus coronatus) at Big Horse and Little Horse Creek Bridges, Victoria Highway, Northern Territory*. Museum and Art Gallery of the Northern Territory, Darwin.
- Lewis D. (2002) *Slower than the eye can see; environmental change in northern Australia's cattle lands - a case study from the Victoria River District, Northern Territory*. Tropical Savannas Cooperative Research Centre, Darwin.
- McGill A.R. (1970) *Australian Warblers*. The Bird Observers Club, Melbourne.

- Petheram R. J. and Kok B. (2003) *Plants of the Kimberley region of Western Australia*. University of Western Australia Press, Crawley, Western Australia.
- Pizzey G. and Knight F. (2003) *The Field Guide to the Birds of Australia*. Harper Collins Publishers, Sydney.
- Rowley I. (1988) *The Purple-crowned Fairy-wren* *Malurus coronatus*. Royal Australian Ornithological Union Conservation Statement. RAOU Report No. 34.
- Rowley I. (1993) The Purple-crowned Fairy-wren *Malurus coronatus*. I. History, distribution and present status. *Emu* 93, 220-234.
- Rowley I. and Russell E. (1997) *Bird families of the World. Fairy-wrens and Grasswrens*. Oxford University Press, Oxford.
- Sharp D. and Simon B.K. (2002) *Ausgrass: Grasses of Australia*. CD-ROM, Version 1.0. Australian Biological Resources Study, Canberra, and Environmental Protection Agency, Queensland.
- van Doorn A. (2007a) *Purple-crowned Fairy-wren (Malurus coronatus coronatus) habitat and population survey on Bradshaw Field Training Area (BFTA)*. Report prepared for Defence Support NT/K. Victoria River District Conservation Association (VRDCA), Katherine.
- van Doorn A. (2007b) *Ecology and conservation of the purple-crowned fairy-wren Malurus coronatus coronatus in the Northern Territory, Australia*. PhD thesis, University of Florida, Gainesville, Florida, USA.
- van Doorn A. (2008) *River Grass (Cane Grass) Chionachne cyathopoda habitat distribution survey (Lost Creek-Victoria River Bridge), 25-27 July 2008*. Report prepared for the Department of Planning & Infrastructure, Palmerston.

Purple-crowned Fairy-wren pair (female above; male below) among Rivergrass *Chionachne cyathopoda* along the Victoria River. (A. van Doorn)

